Agricultural Working Group Meeting 1/24/11 #3 Handout

James River and Tributaries – Richmond TMDL Implementation Plan Development

Goochland, Powhatan, Henrico, Chesterfield Counties and City of Richmond, VA

Facilitator: *Ram Gupta, DCR*

Recorder: *Margaret Smigo, DEQ*

All previous meeting minutes and handouts at: http://www.deq.virginia.gov/tmdl/ipproj.html

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Introductions & Attachments (5 mins)

Total Maximum Daily Load (TMDL) Study Results (5 mins)

Only Bernards Creek, Powhite Creek, Almond Creek, Tuckahoe Creek, and the James River (riverine) required reductions to agricultural bacteria sources in the TMDL. Of these streams, Bernards Creek and Almond Creek only required agricultural reductions to direct livestock bacteria loads. The Tuckahoe Creek impairment was specifically added to this IP project. The subwatersheds 26,27,28 are in the Tuckahoe watershed (subtracted subsheds from James River riverine segment).

Table 1. Allocation scenarios for reducing current bacteria in project area impairments.

	Percent Reductions to Existing Bacteria Loads						
Impairment	Wildlife Direct	Wildlife Land Based	**Livestock Direct**	**Agricultural Land Based**	**Human Direct**	**Human and Pet Land Based**	**City of Richmond CSO Program Project Plan Scenario**
Almond	0	0	91	0	100	85	Alternative E and a 52% reduction
Bernards	0	38	99	93	100	96	NA
Falling	0	0	0	0	100	13	NA
Gillie	0	0	0	0	100	94	Alternative E and a 95% reduction
Goode	0	0	0	0	100	96	NA
No Name	0	0	0	0	100	94.5	NA
Powhite	0	0	40	0	100	86	NA
Reedy*	0	97	0	0	100	99.5	NA
All upstream Impairments Allocated:							
JR (riverine)**	0	63	96	99	100	99	Alternative E
JR (tidal)	0	0	0	0	100	0	Alternative E

Reductions to Wildlife loads will not be specifically addressed in the implementation plan.
*New Reedy modeling explained in separate handout

Updated Livestock Populations (15 mins)

Table 2 shows the total livestock animal populations estimated in each impaired watershed. These numbers are non-cumulative (the JR tidal values do not include the JR riverine values now).

Values for Bernards Creek were updated based on past emails from Monacan SWCD.

Dairy population values were updated for James River (riverine) based on information from Monacan SWCD. There is a Dairy CAFO permit in the JM 82 watershed (Genito and Dover Creeks).

Values for Chesterfield Co were updated to remove Beef from all subs (20,23,30,31,34) and Dairy from tidal subs (30,31,34) as dictated in a previous WG meeting. Although, remember that these areas did not require Ag reductions in the TMDL. All other subs were only partially in Chesterfield Co and livestock estimates in those were not changed (4,11-17,21,22). Chesterfield Co indicated they may have updated horse population data that is not yet reflected in this Table.

A "JR Richmond" specific area was added to this table; the drainage area includes only the subwatersheds 7,8,9,59,51,50,47,76,58,56,55. This shows the City of Richmond does not have agricultural bacteria loads.

Table 2. Updated estimated livestock populations in the IP project area (non-cumulative).

Impaired Segment	Beef Adult	Beef Calves	Dairy Calves	Dairy Dry	Dairy Milkers	Hogs	Horse	Sheep/ Goats
Almond Creek	28	27	0	0	0	1	30	6
Bernards Creek	50	0	0	0	0	0	77	150/15
Falling Creek	46	29	0	0	0	31	188	10
Gillie Creek	40	37	0	0	0	2	42	9
Goode Creek	0	0	0	0	0	0	0	0
James River (riverine)	1,094	998	273	273	896	21	800	54
James River (tidal)	523	455	2	2	4	72	739	120
No Name Creek	0	0	0	0	0	0	0	0
Powhite Creek	12	7	0	0	0	3	20	1
Reedy Creek	0	0	0	0	0	0	0	0
Tuckahoe Creek	543	559	42	42	85	17	429	47
Watershed Total	**2,336**	**2,112**	**317**	**317**	**985**	**147**	**2,325**	**397/15**
JR Richmond	0	0	0	0	0	0	0	0

Questions for the group:

- Can the presence of cattle in Powhite Creek watershed (17) be verified, as this area does require Ag reductions in the TMDL?
- Can the presence of cattle in the Almond Creek watershed (18) be verified, as this area requires Ag reductions in the TMDL?

- Can Chesterfield Co supply updated horse population information for No Name, Powhite, Bernards, JR tidal, Falling, JR riverine, Reedy?

Accounting for Agricultural BMPs Installed (20 mins)

It is recognized that the SWCDs/NRCS have been working in these watersheds to establish Best Management Practices (BMPs) that are both cost-effective and beneficial to the farmer and the environment. Table 3 was created from the DCR Ag BMP database website. These are the BMPs most efficient in removal/prevention of bacteria within this list. All of the Buffer Land and Streamside Fencing BMPs were installed in the Norwood Creek (JM81) and Genito Creek/Dover Creek (JM82) subwatersheds. (These subwatersheds are within this project area.) The streamside fencing values were accounted for in Table 4.

To estimate fencing requirements, the stream network was overlaid with land use. Stream segments that flowed through or adjacent to pasture were identified (the forest land use was not used). If the stream segment flowed through pasture area, it was assumed that fencing was required on both sides of the stream, while if a stream segment flowed adjacent to the pasture area, it was assumed that fencing was required on only one side of the stream. These assumptions were further refined to examine size of resultant pasture and existing BMPs. Due to limitations with the available GIS hydrology stream layers only perennial streams were included in this process. Not every land-use area identified as pasture has livestock on it at any given point in time. However, it is assumed that all pasture areas have the potential for livestock access.

The acres of Continuous No-till were updated in the Table below. This area is located in the JR tidal watershed per the DCR Ag BMP database.

Table 3. Agricultural BMPs Already Installed.

BMP name	BMP Code	Units	# Units Installed	Average Acres Benefited	Average System Cost
Continuous No-till System**	SL-15A	Acres	1,871.5	21.5	$2,106.17
CREP Riparian Forest Buffer	CP-22	Acres	33.5	6.7	$477.10
Grazing Land Protection*	SL-6	Lin. Feet	17,397	36.5	$8,854.83
Permanent Veg. Cover on Cropland	SL-1	Acres	39.4	6.6	$1,144.03
Protective Cover for Specialty Crops	SL-8	Acres	2.9	2.9	$101.50
Reforest. of Erodible Crop/Pasture	FR-1	System	1	8.0	$2,400.00
Riparian Forest Buffer	CRFR-3	Acres	20.4	4.1	$3,434.04
Stream Protection*	WP-2	Lin. Feet	600	2.4	$5,103.78

*Accounted for in Table 4
** All area within the JR tidal watershed, which does not require further Ag NPS bacteria reductions

Questions for the group:

- Of the Nutrient Management Plans in Bernards and JR riverine watersheds, what is the total feet of stream buffered on these farms?

- Are there areas of pasture in the maps below that do not have livestock grazing?
- Are there areas of pasture or cropland in the maps below that are no longer these land uses?

Streamside Fencing for Cattle (10 mins)

In order to reduce direct bacteria from livestock, some form of livestock stream exclusion is necessary. Streamside fencing eliminates direct livestock bacteria loads, prevents livestock from eroding the stream bank, provides a buffer for capturing pollutants in runoff from pasture, and establishes (with the growth of streamside vegetation) one of the foundations for clean water. The inclusion of a buffer helps to reduce bacteria, as well as other possible pollutants, in runoff. The incorporation of effective buffers could reduce the need for more costly control measures.

- The Livestock Exclusion with Riparian Buffer (SL-6 and LE-1T) systems include streamside fencing, interior fencing, alternative watering system, and require a 35-ft buffer from the stream. The SL-6 practice offers a cost-share up to 75%, whereas the LE-1T practice offers a maximum of 85% and can only be installed in a TMDL IP watershed.
- The Livestock Exclusion with Reduced Set-Back (LE-2T) system is similar to the LE-1T, except that it only requires a 10-ft buffer and offers a maximum of 50% cost-share, and can only be installed in a TMDL IP watershed.
- The Stream Protection (WP-2T) system includes streamside fencing, hardened access/crossing options, requires a 35-ft buffer, and offers a 75% cost-share, and can only be installed in a TMDL IP watershed. In cases where a watering system already exists, a WP-2T system is a more appropriate choice.
- 7% of the total fencing needed was calculated as fence maintenance needed during the project.
- All fencing system needs will be placed in StageI as it gives us the greatest cost-benefit for bacteria removal.

Table 4. Estimated Stream Fencing Installed and Needed.

Stream Name	Estimated Fence Length Needed (ft)	Cost-Share Fence installed (ft)*	Total Fence Length Needed (ft)	Fence Maintenance (ft)	Livestock Exclusion Systems Needed (LE-1T, LE-2T, SL-6 or WP-2T)
Almond Creek	73	0	73	5	1
Bernards Creek	14,770	0	14,770	1,034	12
James River (riverine)**	118,004	17,997	100,007	7,000	81
Powhite Creek	550	0	550	39	1
Tuckahoe Creek	68,130	0	68,130	4,769	55
Project Totals	**201,454**	**17,997**	**183,457**	**12,842**	**149**

*Values estimated from BMPs already installed (as shown in Table 1)
**Values for the James River (riverine) are not double counting Bernards Creek, Powhite Creek, or Tuckahoe Creek values

NPS BMPs Needed (20 mins)

In order to meet the water quality standards, additional BMPs are needed that treat or prevent bacteria from traveling to surface waters. The bacteria load model was updated to include revised livestock populations,

which changed Table 5 the estimated Ag BMPs needs in Bernards Creek, Tuckahoe Creek, and the James River (riverine) impairments. (Almond Creek and Powhite Creek did not require land-based reductions to agricultural bacteria loads.) This is an ever changing table, as new information is received from the Ag WG and Steering Committee as we continue through IP development. Please answer the questions below.

Nutrient Management Plans on Cropland was added as a BMP because stream buffers are required in NMPs. Stream buffers have bacteria removal potential and we can include these in the bacteria load model.

Table 5. Updated estimated Agricultural land-based BMPs Needed.

Control Measure	Unit	Bernards Creek	James River (riverine)	Tuckahoe Creek	Stage of Project
Improved Pasture Management	Acres	992	15,851	2,560	StageI
Loafing Lot Management - Dairy	System	0	?	?	StageII
Loafing Lot Management - Beef	System	0	?	?	StageII
Manure Incorporation – Crop	Acre	0	0	0	StageI
Conservation Tillage – Crop (SL-15A)	Acre	234	2,851	460	StageI
Waste Storage - Horse	System	?	?	?	StageII
Reforestation of Erodible Cropland (FR-1)	Acre	?	?	?	StageI
Reforestation of Erodible Pasture (FR-1)	Acre	?	?	?	StageI
Nutrient Management Plans - Cropland	Acres	234	2,851	460	StageI
Retention Ponds – Pasture	Acres - Treated	108	9,148	1,477	StageII

ATTENTION: After including alternative BMPs (Livestock fencing with 100 foot buffers, more urban/residential BMPs) there is still a need for the "Retention Ponds – Pasture" BMP in each of the watersheds in order to meet the overall load reduction goals. The inclusion of Loafing Lot Management systems for Dairy and Beef, Waste Storage Sheds for Horse manure, and Reforestation of Erodible Cropland/Pasture were not included in this analysis. (MapTech is waiting for information on bacteria removal efficiency used for FR-1, see question below.) MapTech needs your input on how many of these systems could be included in the plan, and how many cattle (a % of the total) they would service. Please take the time AT THIS MEETING to discuss and answer all questions below.

Questions for the group:

- How many Dairy operations would benefit from a Loafing Lot Management system? Would this cover all the dairy cattle in Bernards/JRriverine?
- How many Beef operations would benefit from a Loafing Lot Management system? Would this cover all the beef cattle in Bernards/JRriverine?

- How many total farms with horses are in the watersheds? How many farms/barns would benefit from a Waste Storage Shed for the horse waste in each watershed?
- How many acres of Cropland and Pasture could be a part of the Reforestation of Erodible Cropland/Pasture (FR-1) BMP?
- Are the Stages noted in the right-most column in Table5 reasonable for this IP project? These are organized as shown here, based on bacteria removal efficiency and overall costs to get the most "bang-for-the-buck" during StageI.

Reminder: The Implementation Plan is a Staged plan and we can place the most beneficial BMPs in StageI and leave the more expensive/controversial BMPs to StageII. As installation of the StageI BMPs occurs, it is possible that greater water quality benefits are observed in water sample monitoring results, than what our model estimated. The right-most column in Table5 can change based on discussion at this meeting.

Agricultural BMP Cost Estimates (10 mins)

The streamside fencing system costs shown in Table 6 were increased due to discussion at previous meetings.

All other costs are now consistent with the Lynchburg IP and other IPs in Virginia.

Table 6. Estimated Costs of Agricultural BMPs.

Agricultural Control Measure	Unit	Cost per Unit
Grazing Land Protection System (LE-1T)	System	$25,000
Stream Protection System (LE-2T)	System	$25,000
Grazing Land Protection System (SL-6)	System	$25,000
Streamside Protection (WP-2)	System	$8,000
Streamside Fence Maintenance	Foot	$3.50
Improved Pasture Management	Acre	$150
Loafing Lot Management - Dairy	System	$10,000
Loafing Lot Management - Beef	System	$10,000
Manure Incorporation – Cropland	Acre	$80
Conservation Tillage – Cropland	Acre	$100
Small Horse Manure Shed	Number	?
Reforestation of Erodible Cropland	Acre	$154
Reforestation of Erodible Pasture	Acre	$154
Nutrient Management Plans - Cropland	Acres	$70
Retention Ponds – Pasture	Acres – Treated	$140

Questions for the group:

- The local average cost of an SL-6 system was $8,854 for data in the DCR Ag BMP database. Due to discussion in the 1st meeting the system, costs were increased to $25,000. Does this cost apply to all Livestock Exclusion systems (SL-6, LE-1T, LE-2T)?
- If stakeholders want to include Livestock Exclusion Systems with more than the required 35 foot buffer, what would the cost of these systems be?
- What is a reasonable estimate for the cost of a Small Horse Manure Shed?

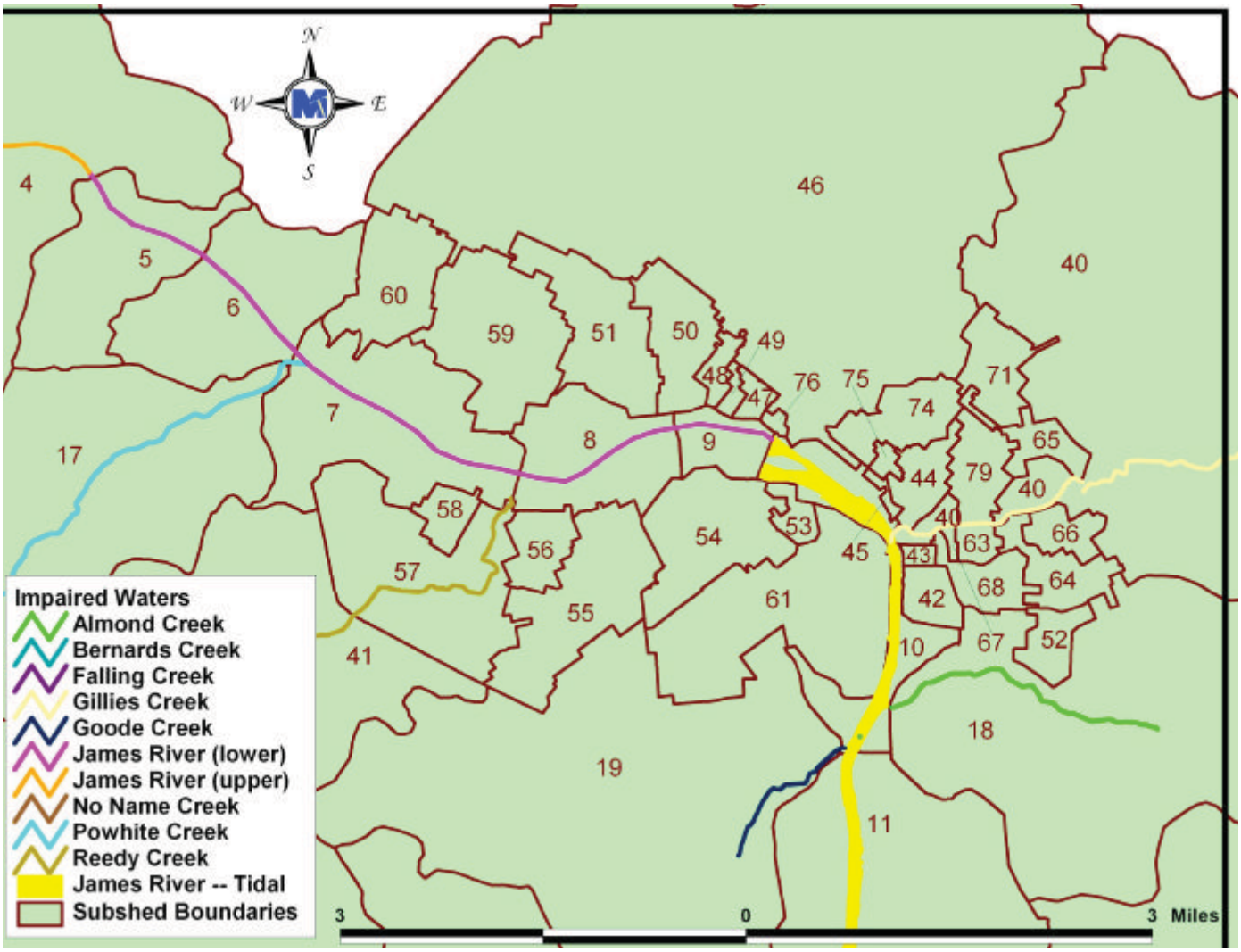

Figure 1. Subwatersheds in the IP study area zoomed into Richmond.

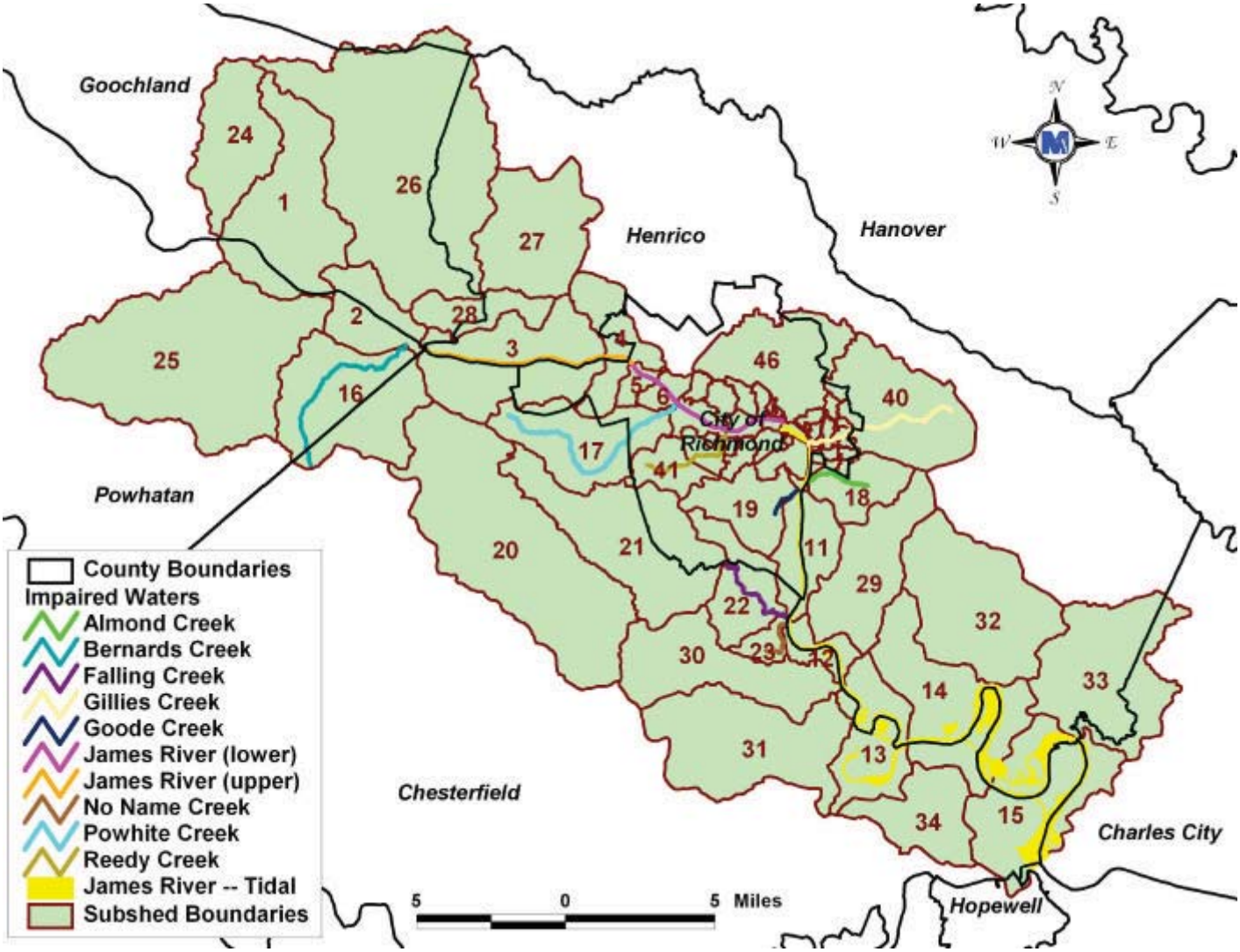

Figure 2. Subwatersheds and County boundaries in the IP study area.

Tuckahoe Creek will be added to all maps.

Table 7. Subwatershed numbers with Stream Name and Counties within the subwatershed.

Sub#	Stream name	Counties	Sub#	Stream name	Counties
1	JR riverine	Goochland, Powhatan	**40**	Gillies Creek	City of Richmond, Henrico
2	JR riverine	Goochland, Powhatan	**41**	Reedy Creek	City of Richmond, Chesterfield
3	JR riverine	City of Richmond, Goochland, Henrico, Powhatan	**42**	JR tidal	City of Richmond, Henrico
4	JR riverine	City of Richmond, Chesterfield, Henrico	**43**	JR tidal	City of Richmond
5	JR riverine	City of Richmond	**44**	Gillies Creek	City of Richmond
6	JR riverine	City of Richmond	**45**	JR tidal	City of Richmond
7	JR riverine	City of Richmond	**46**	JR tidal	City of Richmond, Henrico
8	JR riverine	City of Richmond	**47**	JR riverine	City of Richmond
9	JR riverine	City of Richmond	**48**	JR riverine	City of Richmond
10	JR tidal	City of Richmond, Henrico	**49**	JR riverine	City of Richmond
11	JR tidal	City of Richmond, Chesterfield, Henrico	**50**	JR riverine	City of Richmond
12	JR tidal	Chesterfield, Henrico	**51**	JR riverine	City of Richmond
13	JR tidal	Chesterfield, Henrico	**52**	JR tidal	City of Richmond, Henrico
14	JR tidal	Chesterfield, Henrico	**53**	JR tidal	City of Richmond
15	JR tidal	Charles City, Chesterfield, Henrico, Hopewell	**54**	JR tidal	City of Richmond
16	Bernards Creek	Chesterfield, Powhatan	**55**	JR riverine	City of Richmond
17	Powhite Creek	City of Richmond, Chesterfield	**56**	JR riverine	City of Richmond
18	Almond Creek	City of Richmond, Henrico	**57**	Reedy Creek	City of Richmond
19	Goode Creek	City of Richmond	**58**	JR riverine	City of Richmond
20	Falling Creek	Chesterfield	**59**	JR riverine	City of Richmond
21	Falling Creek	City of Richmond, Chesterfield	**60**	JR riverine	City of Richmond
22	Falling Creek	City of Richmond, Chesterfield	**61**	JR tidal	City of Richmond
23	No Name Creek	Chesterfield	**63**	Gillies Creek	City of Richmond
24	JR riverine	Goochland	**64**	Gillies Creek	City of Richmond, Henrico
25	JR riverine	Powhatan	**65**	Gillies Creek	City of Richmond
26	Tuckahoe Creek	Goochland, Henrico	**66**	Gillies Creek	City of Richmond, Henrico
27	Tuckahoe Creek	Henrico	**67**	Gillies Creek	City of Richmond
28	Tuckahoe Creek	Goochland, Henrico	**68**	Gillies Creek	City of Richmond
29	JR tidal	Henrico	**71**	Gillies Creek	City of Richmond
30	JR tidal	Chesterfield	**74**	JR tidal	City of Richmond
31	JR tidal	Chesterfield	**75**	JR tidal	City of Richmond
32	JR tidal	Henrico	**76**	JR riverine	City of Richmond
33	JR tidal	Charles City, Henrico	**79**	Gillies Creek	City of Richmond
34	JR tidal	Chesterfield			

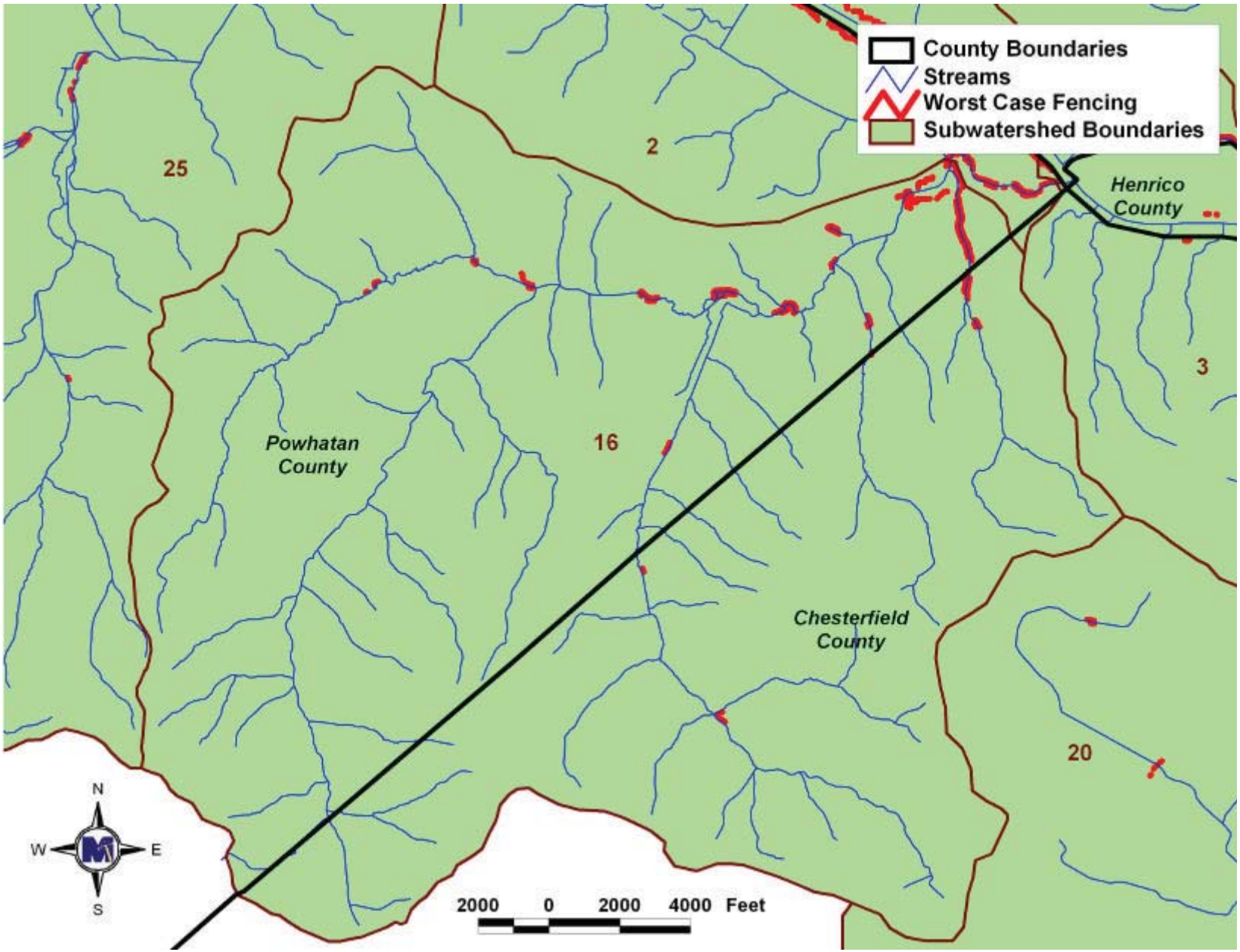

Figure 3. Subwatersheds and Streamside Fencing estimates zoomed into Bernards Creek (sub 16).

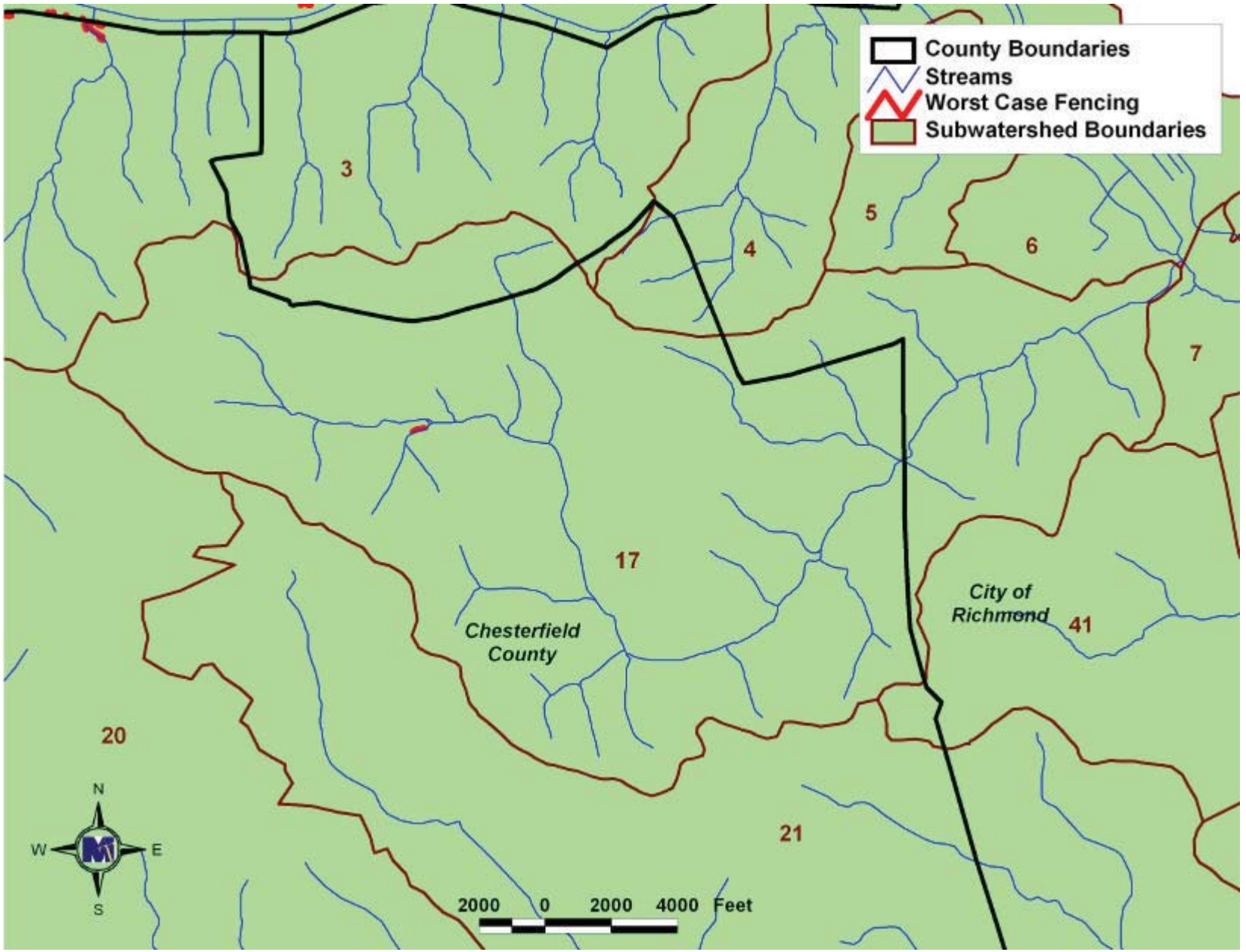

Figure 4. Subwatersheds and Streamside Fencing estimates zoomed into Powhite Creek (sub 17).

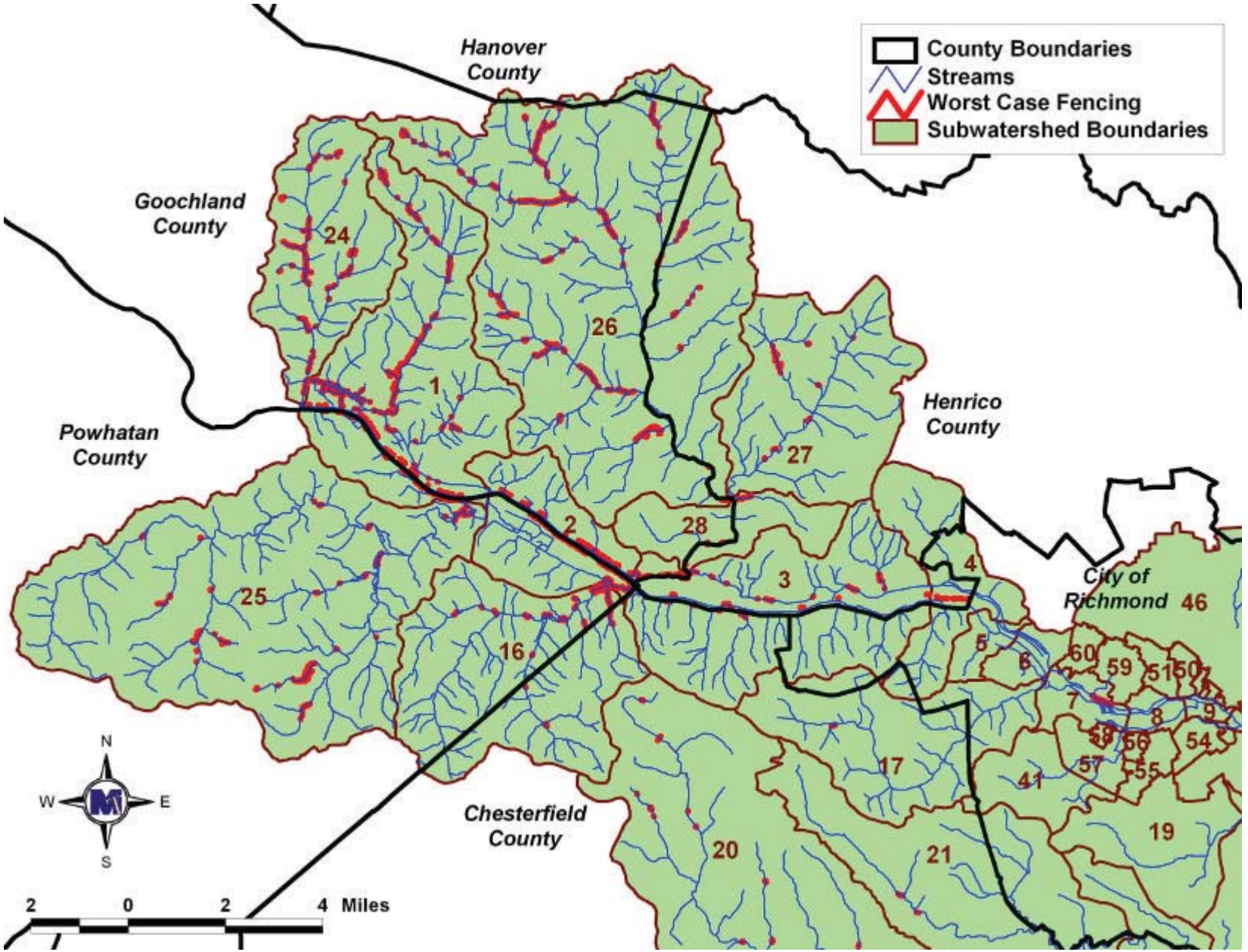

Figure 5. Subwatersheds and Streamside Fencing estimates for the entire James River riverine drainage area.

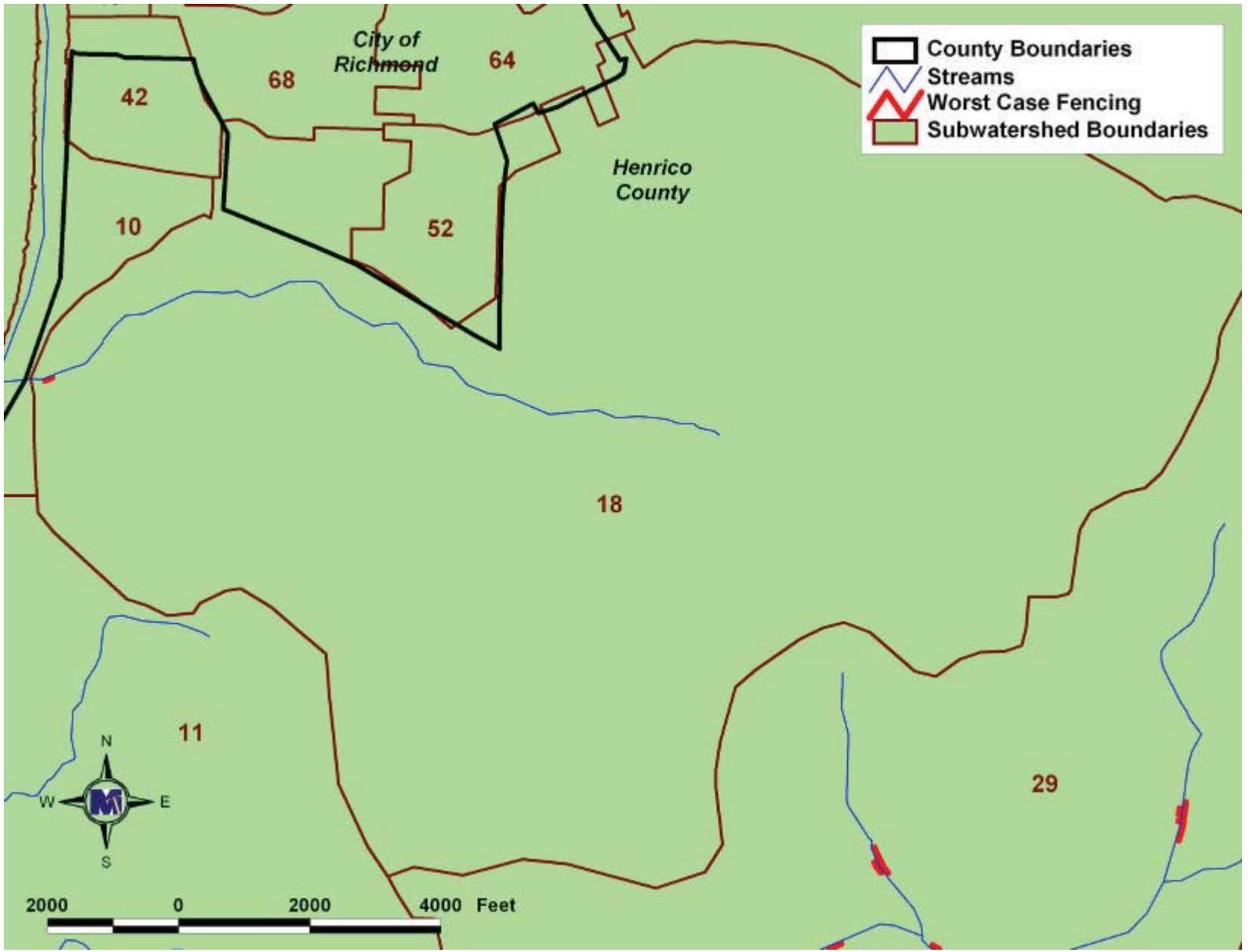

Figure 6. Subwatersheds and Streamside Fencing estimates zoomed into Almond Creek (subs 18 and 52).

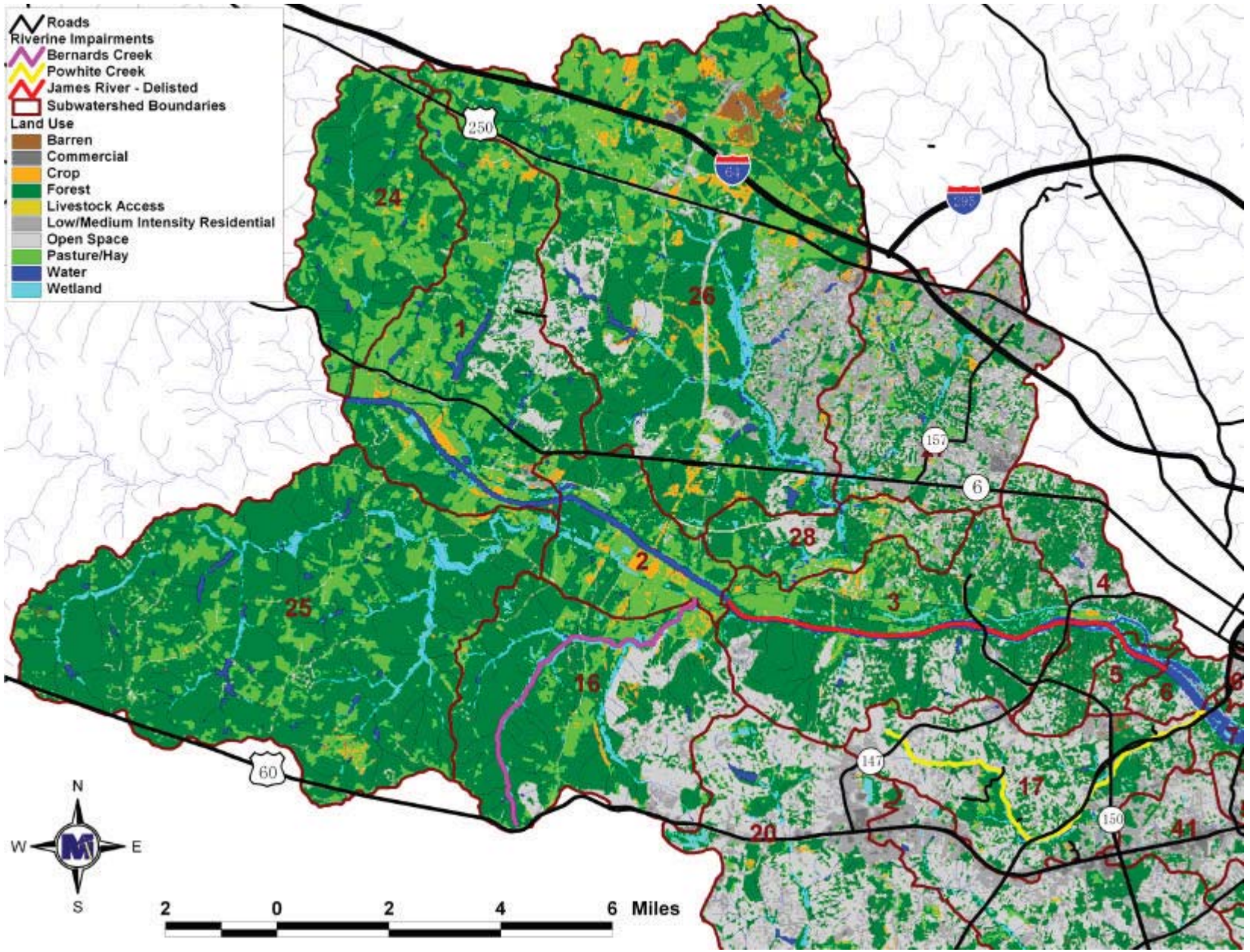

Figure 7. Subwatersheds and Land use zoomed into Bernards Creek, Powhite Creek, Tuckahoe Creek, and JR-delisted.

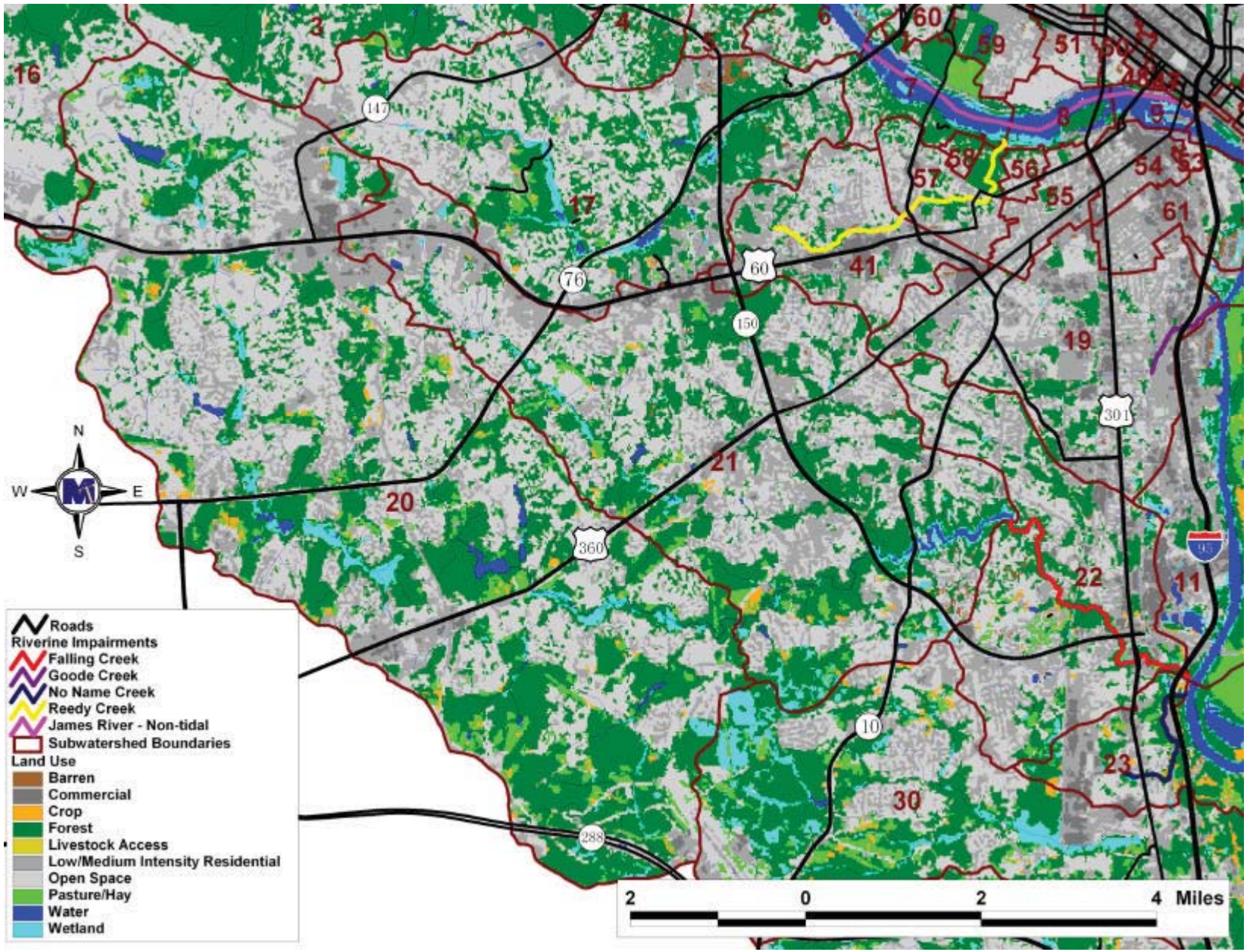

Figure 8. Subwatersheds and Land use zoomed into Reedy Creek, Falling Creek, Goode Creek, No Name Creek, and James River riverine.

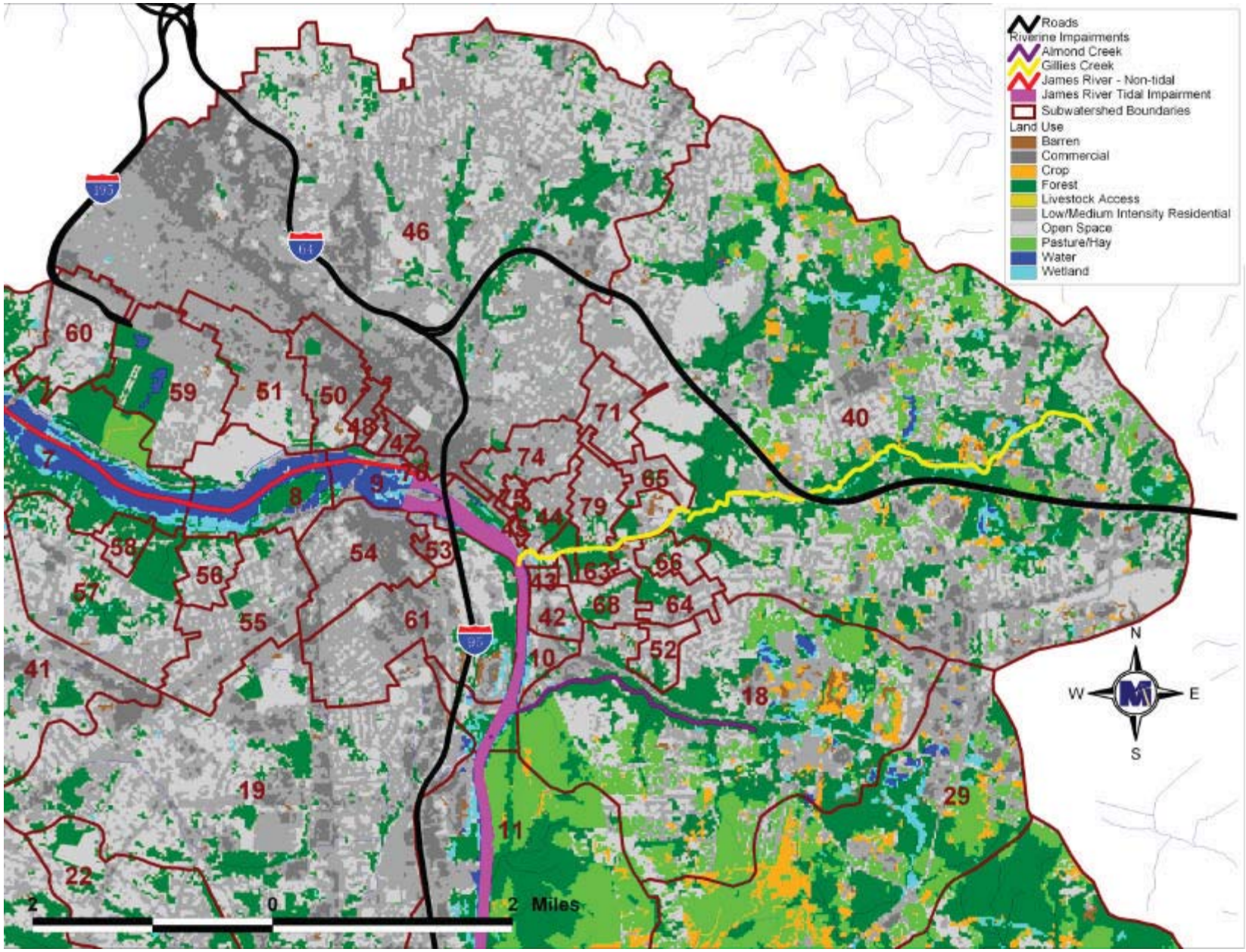

Figure 9. Subwatersheds and Land use zoomed into Gillie Creek, Almond Creek, and James River riverine.

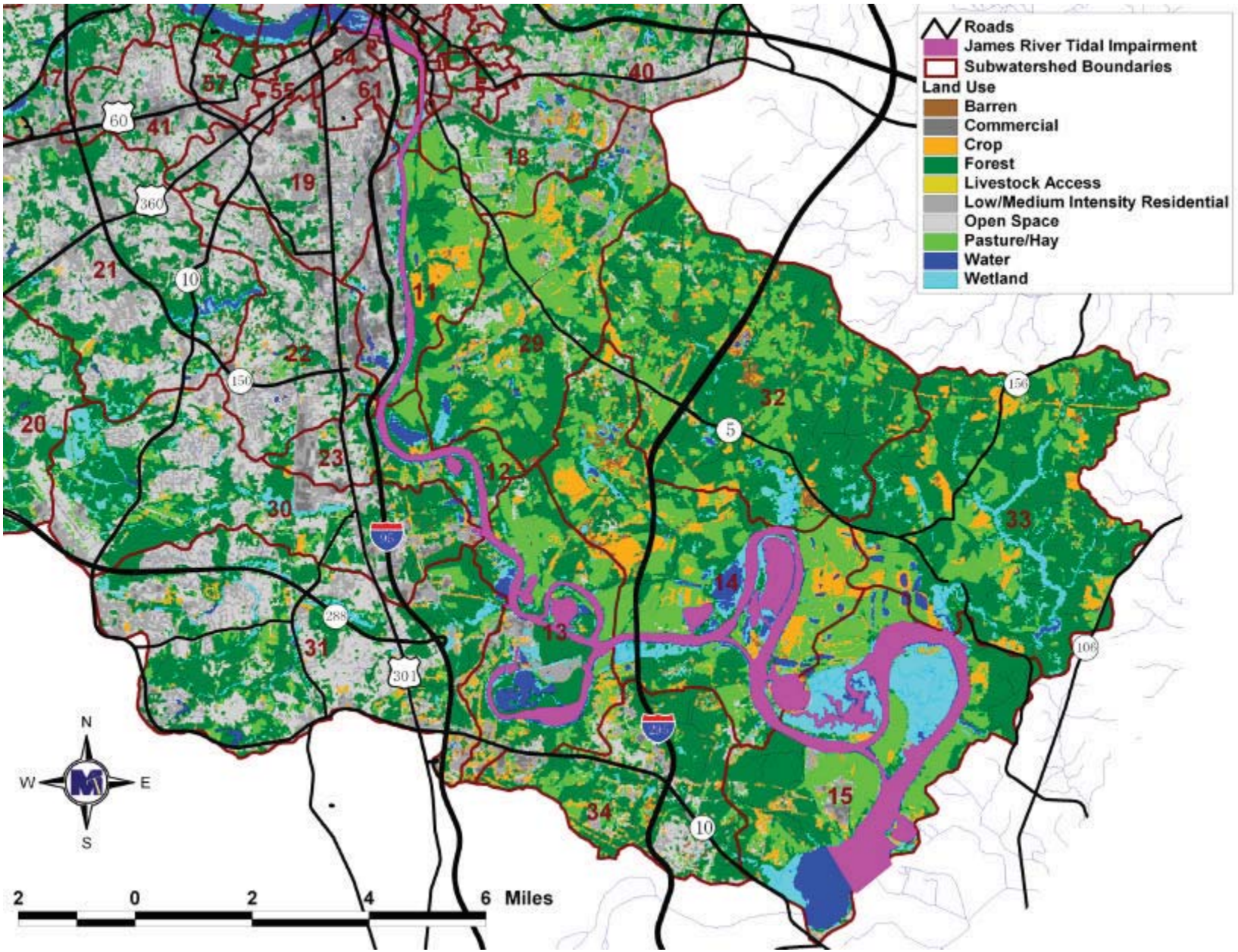

Figure 10. Subwatersheds and Land use zoomed into James River tidal.

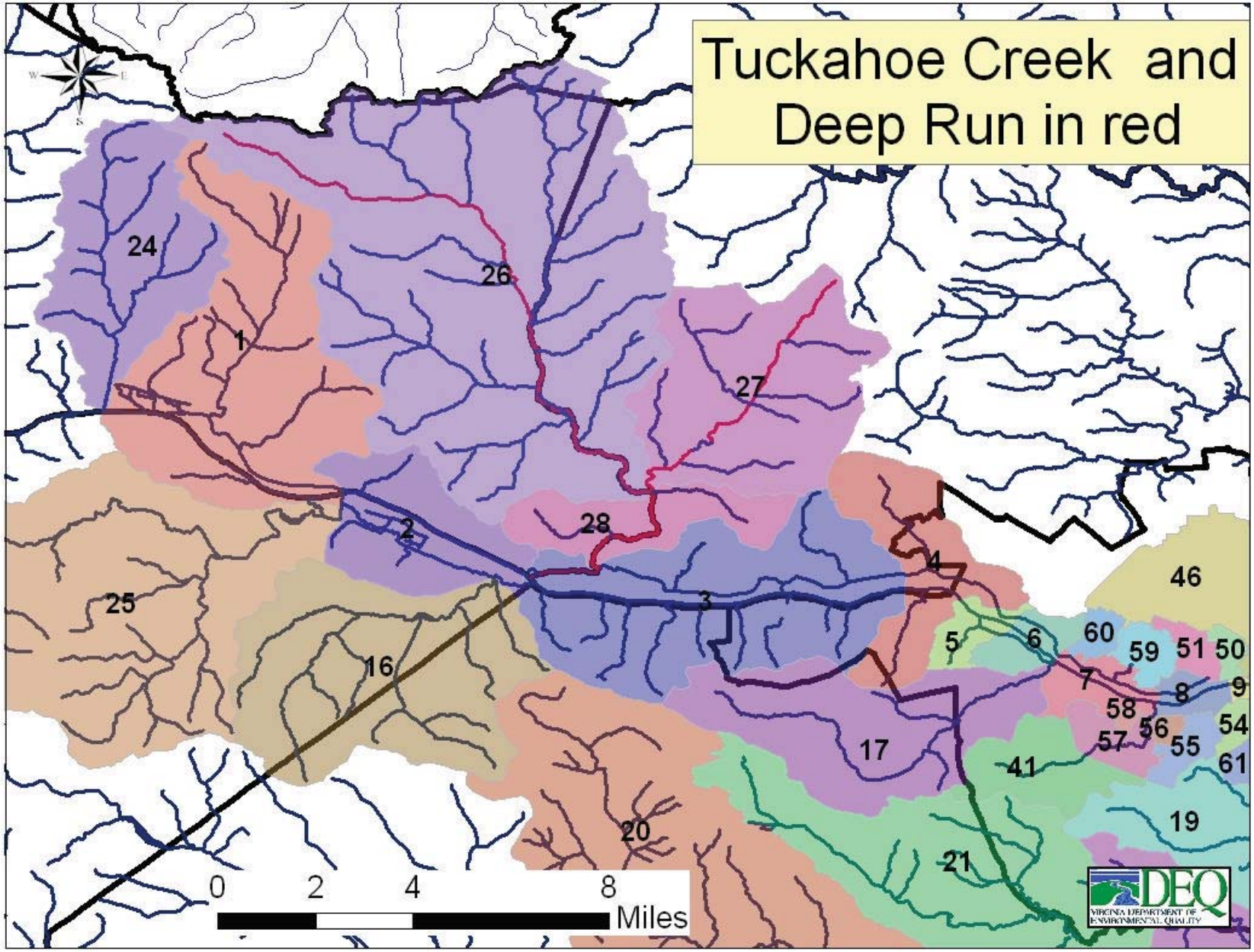

Figure 11. Tuckahoe Creek and tributary Deep Run outlined in Red